



Rapid Ecological Assessment for the Southwest Savanna Ecological Landscape

An Inventory and Analysis of Rare Plants and Animals and High-quality Natural Communities in Support of a Master Plan

Wisconsin's Natural Heritage Inventory Program
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Upper left: York Prairie SNA. Photo by Cathy Bleser.

Upper right: Belmont Mound SNA. Photo by Thomas Meyer.

Lower left: Red-headed Woodpecker (*Melanerpes erythrocephalus*). Photo by Dave Menke. ©

Lower middle: Pale purple-coneflower (*Echinacea pallida*). Photo by Thomas Meyer.

Lower right: Regal fritillary butterfly (*Speyeria idalia*). Photo by Ann Swengel. ©

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Introduction

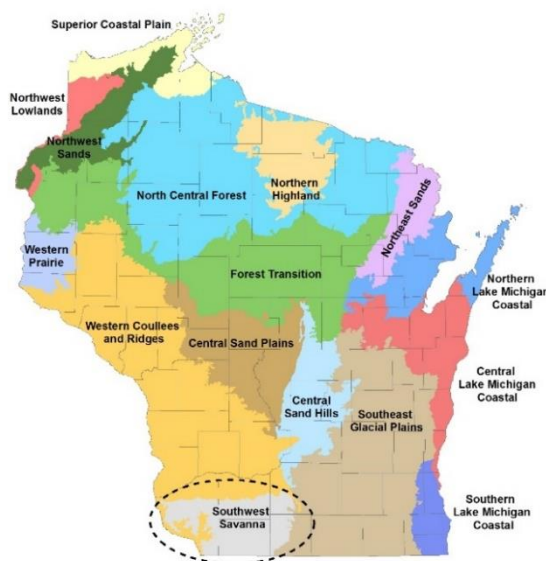
Purpose and Objectives

This report is intended to be used as a source of information for developing the master plan for the Southwest Savanna Ecological Landscape (SWS EL).

The primary objectives of this project were to collect biological inventory information relevant to the master plan for properties in the SWS EL and to analyze, synthesize and interpret this information for use by the master planning team. This effort focused on assessing areas of habitat for rare species and identifying natural community management opportunities.

Surveys for the SWS EL were conducted in 2018 and focused on 1) identifying and evaluating ecologically important areas, 2) documenting or updating rare species occurrences, and 3) documenting or updating occurrences of high-quality natural communities. This report serves as the “Biotic Inventory” used for master planning. There will undoubtedly be gaps in our knowledge of the biota of these properties, especially for certain taxa groups; these groups have been identified as representing either opportunities or needs for future work. Inventory data collected through this effort is a starting point for adaptive management of properties in the SWS EL and should be revisited periodically and updated when new information becomes available.

This inventory was limited to properties being actively planned that had not previously been inventoried by the Wisconsin DNR’s Bureau of Natural Heritage Conservation (NHC) (Table 1). Previous inventories also relevant to the SWS EL should be consulted as necessary for a more complete assessment of the conservation opportunities for properties in the Southwest Savanna EL (Table 2).



Map A. Ecological Landscapes of Wisconsin.

Table 1. Properties included in the Southwest Savanna Ecological Landscape rapid ecological assessment.¹

Belmont Mound State Park (including Belmont Mound Woods SNA)
Belmont Prairie SNA
Browntown-Cadiz Springs State Recreation Area (including Browntown Oak Forest SNA)
Ipswich Prairie SNA
Military Ridge State Trail
New Glarus Woods State Park
Olson Oak Woods SNA
Pecatonica River Woods SNA
Sugar River State Trail
Sugar River Wetlands SNA
York Prairie SNA

¹ Additional properties were inventoried as part of this effort but are not described in this report as they already have a recent master plan. These include the Southwest Grasslands and Coldwater Streams Conservation Area and Hardscrabble Prairie SNA.

Table 2. Properties in the Southwest Savanna Ecological Landscape inventoried through previous NHI rapid ecological assessments.

Property	Inventory Report/Rapid Ecological Assessment	Year Surveyed
Blue Mound State Park	Blue Mound State Park (WDNR 2015b)	2015
Mount Vernon Creek Fishery Area	Driftless Area Streams (WDNR 2012a)	2010-2011
Remnant Fishery Area- Conley Smith Creek	Driftless Area Streams (WDNR 2012a)	2010-2011
Remnant Fishery Area- Little Platte River	Driftless Area Streams (WDNR 2012a)	2010-2011
Yellowstone Lake State Park	Yellowstone Lake & Blackhawk Lake Managed Lands (WDNR 2012b)	2010-2011
Yellowstone Wildlife Area	Yellowstone Lake & Blackhawk Lake Managed Lands (WDNR 2012b)	2010-2011

Overview of Methods

The Wisconsin Natural Heritage Inventory (NHI) program is part of the Wisconsin DNR's Bureau of Natural Heritage Conservation (NHC) and is a member of an international network of natural heritage programs representing all 50 states, as well as portions of Canada, Latin America, and the Caribbean. These programs share certain standardized methods for collecting, processing, and managing data for rare species and natural communities. NatureServe, an international non-profit organization coordinates the network (see www.NatureServe.org for more information).

Natural heritage programs track certain elements of biological diversity: rare plants, rare animals, high-quality examples of natural communities, and other selected natural features. The NHI Working List (WDNR 2018) contains the elements tracked in Wisconsin. They include endangered, threatened, and special concern plants and animals, as well as the natural community types recognized by NHI. The NHI Working List is periodically updated to reflect new information about the rarity and distribution of the state's plants, animals, and natural communities. The most recent Working List is available from the Wisconsin DNR website (*Wisconsin Natural Heritage Working List*).

The Wisconsin NHI uses standard methods for biotic inventory to support master planning. Our general approach involves collecting relevant background information, planning and conducting surveys, compiling and analyzing data, mapping rare species and high-quality natural community locations into the NHI database, identifying ecologically important areas, and providing interpretation of the findings through reports and other means.

Existing NHI data are often the starting point for conducting a biotic inventory to support master planning. NHC's biotic inventory projects typically start with a coarse-filter assessment, followed by targeted surveys for priority taxa, then data processing, analysis and report writing. Survey scope and intensity corresponds to the study area size and ecological complexity, as well as resource availability.

Taxa-specific field surveys for the SWS EL were focused on documenting high quality natural communities, rare plants, breeding birds, small mammals, and herptiles (Table 3). The collective results from these surveys were used, along with other information, to identify, evaluate, and update ecologically important areas (Primary Sites) of the SWS EL.

Table 3. Survey Targets and Methods for Biotic Inventory on the Southwest Savanna EL in 2018.

Survey Target	Surveyors	Methods
Animals		
Breeding Birds	NHC Staff	Surveys followed Wisconsin Breeding Bird Atlas II protocols. Emphasis placed on areas not covered by Atlas blocks.
Herps	NHC Staff	Visual encounter searches for frogs and snakes.
Small Mammals	NHC Staff	Transects utilizing Sherman live traps
Rare plants	NHC Staff	Meander surveys targeting prairies, savannas, wetlands, forests and cliffs.
Natural Communities	NHC Staff	Meander surveys focused on characteristic species, community boundaries, threats and management issues.

Survey locations were identified or guided by using recent aerial photos, USGS 7.5' topographic maps, various Geographic Information System (GIS) sources, information from past survey efforts, discussions with property managers, and the expertise of several biologists familiar with the properties or with similar habitats in the region. Based on the location and ecological setting of properties within the SWS EL, key inventory considerations included the identification of prairies, savannas, sedge meadows, cliffs, upland forests, and the location of habitats that had the potential to support rare species. Private lands, including easements, were not surveyed.

Plant nomenclature follows the Wisconsin State Herbarium (WIS). Vertebrate animals follow standard common names.

For a description of the geology, historical vegetation, and current vegetation of the Southwest Savanna EL, please see Chapter 20 of the [Ecological Landscapes of Wisconsin](http://dnr.wi.gov/publications/2015a) (dnr.wi.gov, keyword Ecological Landscapes) (WDNR 2015a).

Management Considerations and Opportunities for Biodiversity Conservation

The Ecological Landscapes of Wisconsin highlights eight major conservation and management opportunities for the Southwest Savanna Ecological Landscape (WDNR 2015a). These are summarized below, and a list of Primary Sites are presented under each item as examples. This list of sites is not meant to be exhaustive. Property planners and managers may identify important resources outside of primary sites by consulting the NHI Portal, NHI Biotic Inventory survey data or contractor reports, NHC District Ecologists, and other resources noted in the subsections below.

Large-scale Grassland Management

The Southwest Savanna offers several of Wisconsin's best opportunities to manage and maintain upland grasslands, especially at a landscape scale needed by some grassland animals. Native grasslands are now very rare in the Southwest Savanna Ecological Landscape, as they are throughout all of Wisconsin and most of the upper Midwest. In parts of the Southwest Savanna, good quality prairie remnants are embedded within large acreages of agricultural land enrolled in the Conservation Reserve Program (CRP), fallow agricultural land, pasture (including "prairie sod" that has been grazed but never plowed), and cropland. Surrogate grasslands such as CRP, pastures, and planted prairies buffer prairie remnants from less compatible land uses in the vicinity, connect isolated patches of remnant prairie, and provide vital habitat for area-sensitive grassland species (e.g., birds).

A DNR project area that exemplifies large-scale grassland management in the SWS EL is the Southwest Wisconsin Grassland and Stream Conservation Area (SWGSCA). The project boundary encompasses high-priority grasslands, prairies, and watersheds on both public and private lands across southern Iowa, northern Lafayette, southwest Dane, and far northwestern Green counties. Properties inventoried in 2018 that contribute to large-scale grassland management include:

- York Prairie SNA (a small remnant prairie that lies within the SWGSCA; see primary site description below)

Native Prairie Remnants

Native prairie remnants are scattered throughout the Southwest Savanna. The majority of higher quality remnants are small and isolated. Prairie remnants and unplowed prairie sod may offer exceptional restoration opportunities because they have typically retained more of the native flora, fauna (particularly invertebrates), and soil micro-organisms characteristic of the original native grassland ecosystem, than sites that have been more severely disturbed. Protection of prairies that are diverse, relatively free from invasive species, or that support populations of rare species should remain a conservation priority in this ecological landscape. Where feasible, remnants chosen for conservation attention should be managed with other grasslands, including those within working landscapes (e.g., where there is an emphasis on small grain and hay production and/or grazing). The best sites will allow for management flexibility that afford strong protection to the remnants while encouraging uses that are compatible with maintaining populations of species that require large areas. Properties inventoried in 2018 with good-quality prairie remnants include:

- Belmont Prairie SNA (see primary site description below)
- Ipswich Prairie SNA (see primary site description below)
- York Prairie SNA (see primary site description below)

Oak Savanna Restoration

In the Southwest Savanna Ecological Landscape, there are several extensive areas of grazed but never cleared and plowed oak savanna. Characteristic structural attributes of the formerly abundant and widespread oak openings and oak woodland communities persist. The floristic composition of the ground layer has been altered, but the native flora may not have been entirely. Due to the topography in the Southwest Savanna and the past prevalence and behavior of wildfire, open grassland often co-occurred and intermingled with oak savanna. This presents opportunities to manage for both grassland and savanna elements in single, large-scale landscape projects. Oak openings and oak woodlands are now some of the North America's most imperiled natural communities. In southern and western Wisconsin, oak openings formerly covered 15–20% of the ecological landscape (Curtis 1959), making southern Wisconsin an important and logical place in which to attempt to conserve or restore the type, and the Southwest Savanna is potentially among the most important ecological landscapes anywhere in which to accomplish this. Restoration is likely to be most successful and cost-effective where an intact groundlayer of savanna species is still present; where savanna species have been eliminated by historic intensive grazing, invasive species, or fire suppression, restoration will be very difficult.

Yellowstone Lake State Park and Yellowstone Wildlife Area (particularly Yellowstone Savanna SNA), which are included in the Southwest Savanna master plan, have good oak opening/woodland restoration potential. For more information, please see the rapid ecological assessment for [Yellowstone Lake & Blackhawk Lake Managed Lands](#) (WDNR 2012b). Properties inventoried in 2018 that contain good examples of oak woodland include

- Olson Oak Woods SNA (oak woodland and oak forest; see primary site description below)

Continuum of Fire-adapted Vegetation: Prairie-Savanna-Woodland-Oak Forest

The Southwest Savanna and adjacent portion of the Western Coulee and Ridges Ecological Landscape offer potential opportunities to manage sites that encompass the full spectrum of fire-driven natural communities that formerly covered much of this part of Wisconsin. These natural communities are dynamic, and management for structural variability and larger patch sizes that encompass a range of habitats will accommodate more niches and more species than scattered small sites representing only a single vegetation type. Such sites provide habitat for populations of rare species. Such sites also allow species to move around as conditions change and give managers more flexibility. Properties inventoried in 2018 with good examples of a continuum of prairie-savanna-woodland-oak forest include:

- Olson Oak Woods SNA (oak woodland and oak forest; see primary site description below)

Forests

In the Southwest Savanna EL, hardwood forests are most frequent on sites that were afforded some protection from wildfire by natural firebreaks. Dry and dry-mesic forests were dominated by oaks and occurred on slopes that either burned infrequently or with low intensity. Mesic maple-basswood forests were rare and local here, occurring only at sites that had a high degree of protection from fire. However, due both their rarity on the historic and current landscape, they are crucial habitats for a number of species, particularly wildflowers, forest interior breeding birds, and as stopover habitat for migrating birds. Properties inventoried in 2018 with good examples of forests include:

- Belmont Mound Woods SNA (see primary site description below)
- Browntown-Cadiz Springs SRA (see primary site description below for Browntown Oak Forest SNA)
- Olson Oak Woods SNA (see primary site description below)
- Pecatonica River Woods SNA (see primary site description below)

Warmwater Rivers, Streams and Associated Wetlands

Warmwater rivers and streams support native fish, herptiles, and invertebrates, including rare species. Wetlands associated with riparian corridors are most extensive along the largest rivers (e.g., Pecatonica, Sugar, etc.) and include examples of native plant communities, many of which in turn support additional rare or otherwise sensitive species. Few of these wetlands are currently in good condition due to past land and water use practices, and protection and management of remaining good-quality sites is crucial for native plants and animals. Properties inventoried in 2018 with good examples of a warmwater rivers, streams, and associated wetlands include:

- Pecatonica River Woods SNA (see primary site description below)

Coldwater Streams Embedded within Grasslands

Coldwater ecosystems are well represented in the headwaters and upper reaches of many streams in the Southwest Savanna Ecological Landscape. The 2,549 mapped springs in this ecological landscape are critical to the maintenance of coldwater and coolwater systems by providing clean, cold, highly oxygenated water. These sources of groundwater discharge need protection from all forms of degradation, including reduced flow, increases in temperature, and contamination from polluted runoff or infiltration. Within the recharge areas of springs, land uses that limit nonpoint pollution runoff and groundwater withdrawal and promote restoration of grassy or other permanent vegetative cover will help protect these critical natural features and the streams they nourish. Several previously surveyed fishery area properties and streambank protection areas and easements included in the Southwest Savanna master plan may provide good conservation and restoration opportunities for coldwater streams. For more information, please see the rapid ecological assessment for [Driftless Area Streams](#) (WDNR 2012a). One property inventoried in 2018 contained a stretch of coldwater stream and is also classified an Exceptional Resource Water and contains adjacent groundwater-fed wetlands:

- Sugar River Wetlands SNA (see primary site description below)

Caves, Abandoned Mines and Other Subterranean Habitats

Abandoned mines, caves, and other subterranean features are common in parts of the Southwest Savanna. While poorly handled mine waste has resulted in water quality problems, the diggings, along with some natural underground cavities, are being used by bats, including several species that have recently been listed as threatened by the State of Wisconsin. The severe threat posed by the spread of white-nose syndrome, an often-fatal fungal disease that has already killed millions of bats in the eastern United States, makes it imperative that sites used by bats now are identified and protected while wildlife health specialists search for and develop effective treatments. It is likely that other, poorly documented species (e.g., certain invertebrates), also use, and are perhaps dependent on, subterranean habitats. While conservation of bat hibernacula is crucial, restoration and maintenance of habitat in the surrounding landscape is also important as bats utilize adjacent forests, savannas, wetlands, and river and stream corridors for foraging, roosting, and maternal colonies. While no properties inventoried in 2018 contained good examples of caves and other subterranean features, other previously surveyed properties provide good conservation opportunities, such as Blue Mound State Park.

Wildlife Action Plan Implementation and the Southwest Savanna Ecological Landscape

Conservation Opportunity Areas

Conservation Opportunity Areas (COAs) are places in Wisconsin that contain ecological features, natural communities, or SGCN habitat that present the greatest likelihood of successfully implementing conservation actions when viewed from the global, continental, upper Midwest, or state perspective (WDNR 2008). Several COAs occur in the SWS EL.

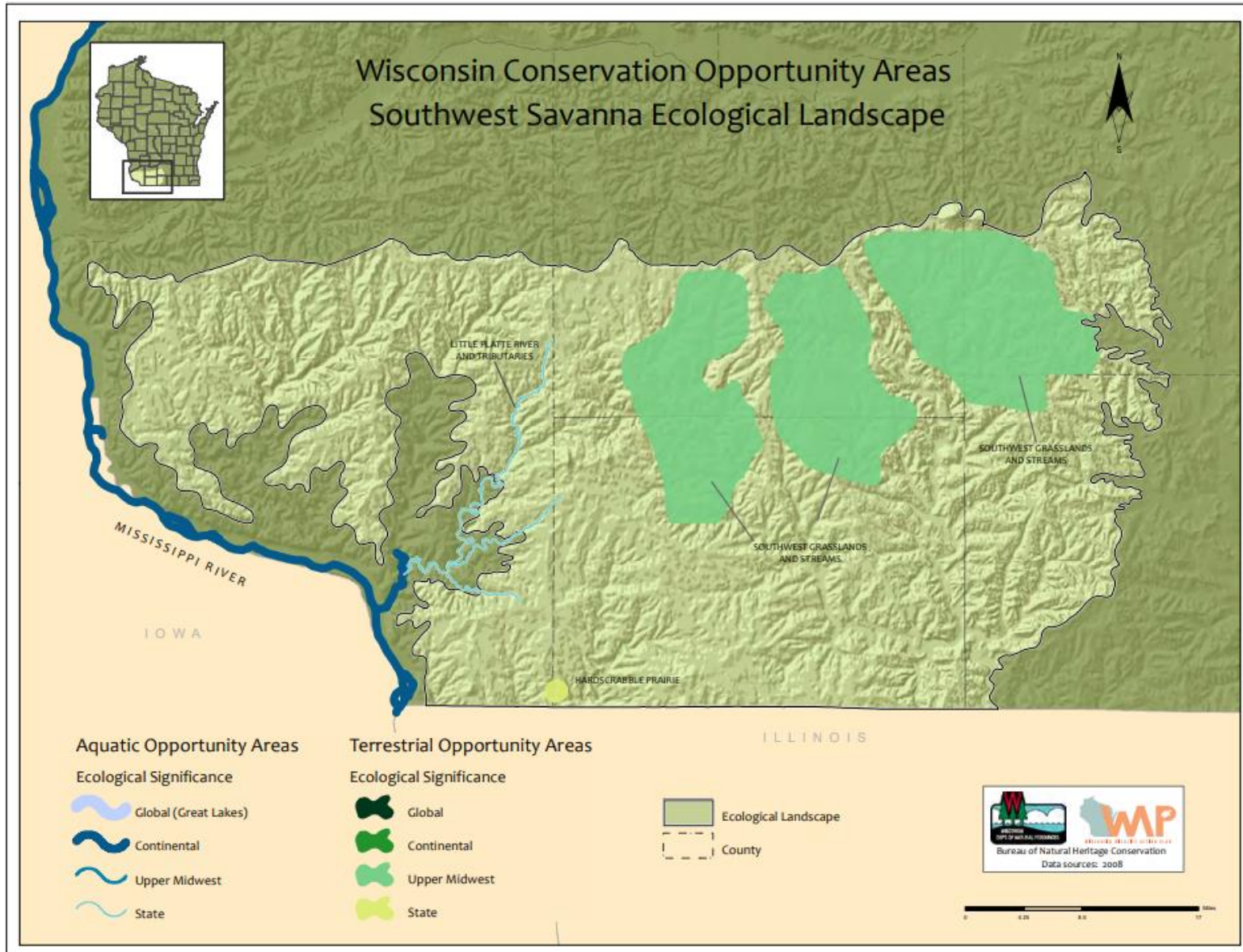
Opportunities for Natural Community Conservation

Opportunities for sustaining natural communities in Ecological Landscapes were developed by the Ecosystem Management Planning Team (EMPT 2007) and focused on wildlife Species of Greatest Conservation Need and their habitat in the Wisconsin Wildlife Action Plan (WDNR 2015c). The goal of sustaining natural communities is to manage for natural community types that 1) historically occurred in a given landscape and 2) have a high potential to maintain their characteristic composition, structure, and ecological function over a long period of time (e.g., 100 years). This list can help guide land and water management activities so that they are compatible with the local ecology of the Ecological Landscape while maintaining important components of ecological diversity and function. Based on EMPT's criteria, these are the most appropriate community types that could be considered for management activities within each Ecological Landscape.

The Wisconsin Wildlife Action Plan (WDNR 2015c) identifies 23 natural communities for which there are "High" or "Moderate" opportunities for protection, restoration, or management on the Southwest Savanna Ecological Landscape (Table 4). For information on conservation actions that are beneficial for these communities, please refer to the Wisconsin DNR website, keyword "Wildlife Action Plan".

Table 4. Natural Communities that occur on properties inventoried in 2018 with High or Moderate Opportunities for Protection, Restoration or Management in the Southwest Savanna Ecological Landscape (WDNR 2015c).

Community Type	
Coldwater streams	Oak Woodland
Coolwater streams	Southern Dry Forest
Dry Cliff	Southern Dry-mesic Forest
Dry Prairie	Southern Mesic Forest
Dry-mesic Prairie	Spring Pond
Floating-leaved Marsh	Springs and Spring Runs, Hard
Lacustrine Mud Flat	Springs and Spring Runs, Soft
Mesic Prairie	Surrogate Grasslands
Moist Cliff	Warmwater Streams
Oak Opening	Wet-mesic prairie



Map B. Conservation Opportunity Areas of the Southwest Savanna EL (WDNR 2008).

Opportunities to Conserve Species of Greatest Conservation Need (SGCN) and Rare Plants

The Wisconsin Wildlife Action Plan also notes Species of Greatest Conservation Need (WDNR 2015c) associated with each Ecological Landscape. Species of Greatest Conservation Need (SGCN) are animals that have low and/or declining populations that need conservation action. They include various birds, fish, mammals, reptiles, amphibians, and invertebrates (e.g., dragonflies, butterflies, and freshwater mussels) that:

- Are already listed as threatened or endangered;
- Have few, low, or declining populations, and/or threats their populations or habitats;
- Are stable in number in Wisconsin, but declining in adjacent states or nationally;
- Have biological, genetic or ecological characteristics that place them at risk or make them vulnerable to decline.

There are 68 SGCN and 26 rare plants highly or moderately associated with the Southwest Savanna Ecological Landscape. This means that these species are significantly associated with the EL, and that restoration of natural communities with which these species are associated would significantly improve their conditions.

The Wisconsin Wildlife Action Plan also identifies ecological priorities for conservation by highlighting the natural communities in each Ecological Landscape that are most important to the SGCN (Figure 1). While many communities that occur on the SWS EL have major or important conservation opportunities, some of these communities support more SGCN and rare plant species than others (Figure 2). For example, dry prairie, and dry-mesic prairie support a significant number of rare species in the SWS EL. Although all of these rare species do not necessarily occur on DNR properties, natural communities with higher species counts provide a disproportionate benefit to a greater number of SGCN and rare plants across the SWS EL and may warrant special consideration in the master planning process. This intersection of SGCN and rare plants with priority natural communities represents the best opportunities for management on the SWS EL from an ecological and biodiversity perspective. For a complete list of which SGCN are associated with the SWS EL, please see the Wisconsin Wildlife Action Plan website (<https://dnr.wi.gov/>, keyword "Wildlife Action Plan"), or for species associated with specific natural communities, see the natural community pages (<https://dnr.wi.gov/>, keyword "Natural Communities").

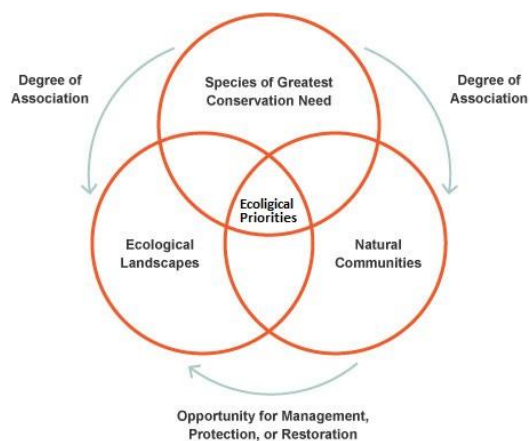


Figure 1. Diagram of ecological priorities based on the Wildlife Action Plan.

Taxa and species-specific conservation opportunities in the SWS EL include:

- Rare and declining birds associated with grasslands such as upland sandpiper, short-eared owl, western meadowlark, grasshopper sparrow and Henslow's sparrow. Brushy areas within a grassland matrix provide habitat for Bell's vireo, brown thrasher and yellow-breasted chat. Uncommon mammals such as prairie vole and prairie deer mouse also occur in the grasslands here.
- Rare invertebrates associated with remnant dry and dry-mesic prairie (e.g., regal fritillary butterfly, red-tailed prairie leafhopper).
- Numerous rare plants associated with prairie and savanna remnants (dry, dry-mesic, mesic, wet-mesic).

- Midwest endemics such as Glade mallow (*Napaea dioica*, a forb formerly found in mesic to wet-mesic prairies or savannas, but now largely restricted to current and former railroad rights-of-way), kitten tails (*Besseyia bullii*), and Hill's thistle (*Cirsium hillii*).
- The federally-listed prairie bush-clover (*Lespedeza leptostachya*).
- Birds and bats associated with oak savanna, such as red-headed woodpecker, eastern whip-poor-will, the eastern pipistrelle and other bats.
- Bats and their hibernacula, which can include natural caves as well as abandoned mines, which are common in the SWS EL.
- Rare frogs associated with small ponds, rivers, and springs, such as Blanchard's cricket frog and pickerel frog.
- The federally-threatened rusty patched bumble bee, which can be found in a variety of habitats with abundant forbs for nectar including prairie, savanna, wetlands, and surrogate grasslands.
- Rare fish, such as Ozark minnow, which inhabits clear, small-to-medium size streams of low gradient, with gravel to rubble bottoms. Additional rare fish species for which the SWS EL is important include the gravel chub and black buffalo.

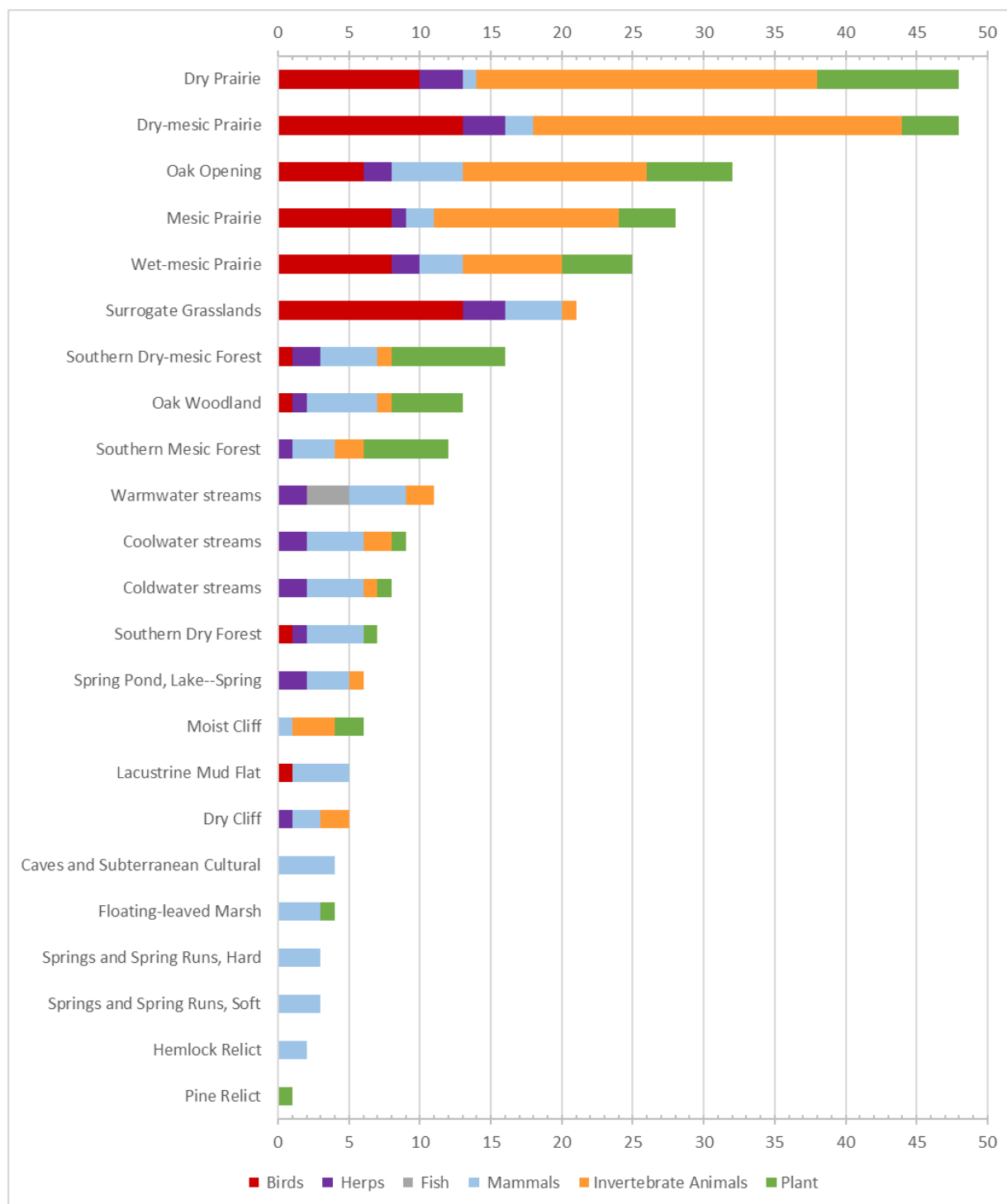


Figure 2. Number of SGCN and Rare Plants Highly or Moderately Associated with Natural Communities that have High or Moderate Opportunities for Protection, Restoration or Management in the Southwest Savanna Ecological Landscape.²

² Figure represents the SGCN and rare plants that are moderately or highly associated with the respective natural communities. Species and natural communities represented are limited to those that are moderately to highly associated with the Southwest Savanna Ecological Landscape.

Primary Sites: Site-specific Opportunities for Biodiversity Conservation

Twelve ecologically important sites were identified on the Southwest Savanna Ecological Landscape during surveys in 2018 (Map D). These “Primary Sites” were delineated because they generally encompass the best examples of:

- 1) Rare and representative natural communities,
- 2) Documented occurrences of rare species populations, and/or
- 3) Opportunities for ecological restoration or connections.

Table 5. Southwest Savanna Ecological Landscape Rapid Ecological Assessment Primary Sites based on 2018 surveys.

Code	Primary Site Name
SWSEL01	Sugar River Wetlands SNA
SWSEL02	Military Ridge State Trail
SWSEL03	Sugar River State Trail
SWSEL04	Olson Oak Woods SNA
SWSEL05	York Prairie SNA
SWSEL06	Browntown Oak Forest SNA
SWSEL07	Pecatonica River Woods and Meadows
SWSEL08	Belmont Mound Woods SNA
SWSEL09	Belmont Prairie SNA
SWSEL10	Ipswich Prairie SNA

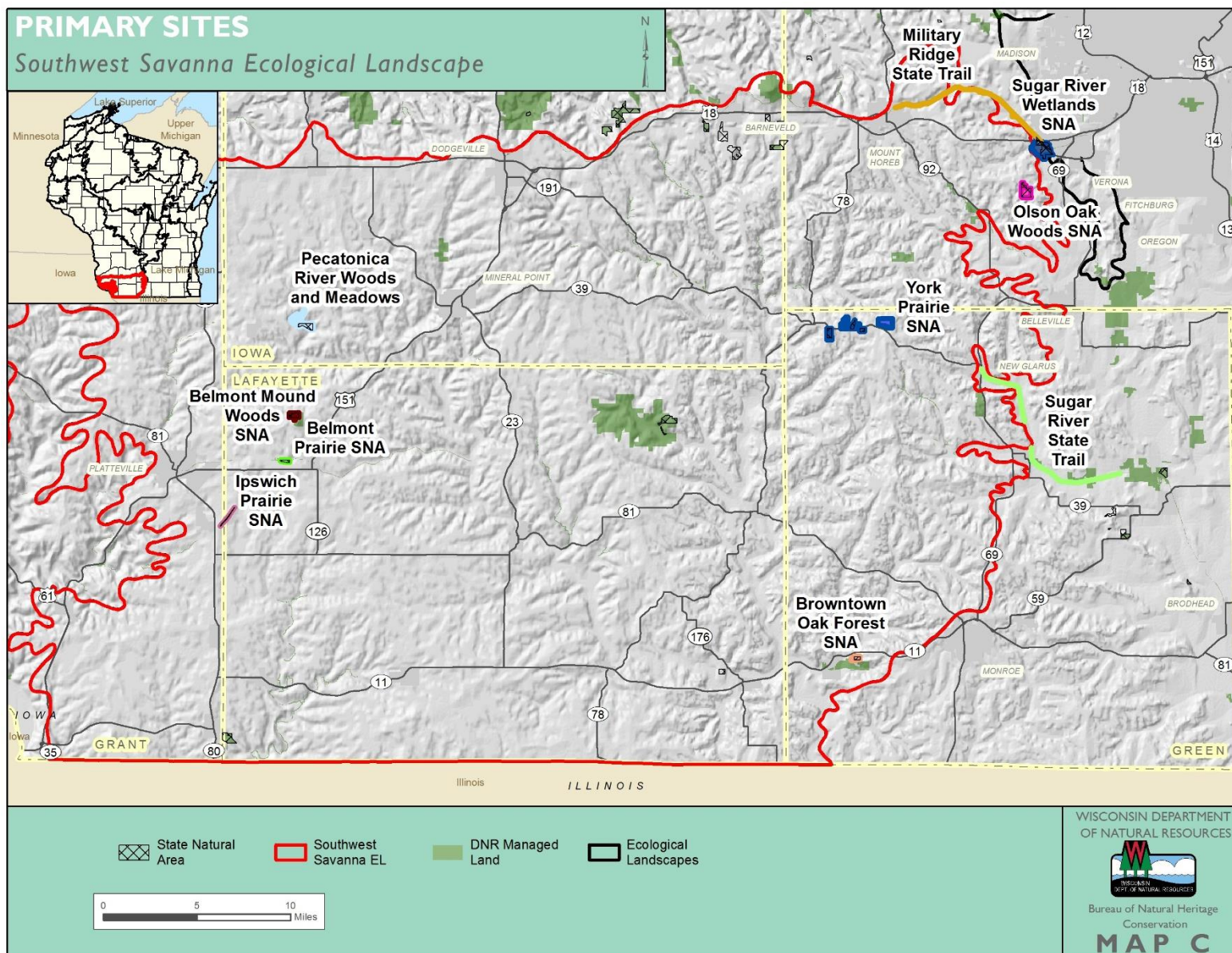
These sites warrant high protection and/or restoration consideration during the development of the property master plan. This report is meant to be considered along with other information when identifying opportunities for various management designations during the master planning process.

Primary Sites are also considered High Conservation Value Forests (HCVFs) for the purposes of Forest Certification, which requires the identification and periodic monitoring of HCVFs. All DNR-managed lands, including state forests, parks, wildlife and fishery areas, and natural areas are certified. Certified forests are recognized by the Forest Stewardship Council (FSC) and the Sustainable Forestry Initiative (SFI) as being responsibly managed (Forest Stewardship Council 2009).

Information provided in the summary paragraphs below includes location information, a site map, summary of the natural features present, important plant and animal species, the site’s ecological significance, and management considerations.

The Primary Sites described below are in addition to the sites identified during other Rapid Ecological Assessments and Biotic Inventory Reports that occur within or partially within the SWS EL. These include:

- [Blue Mound State Park](#) (WDNR 2015b)
- [Driftless Area Streams](#) (WDNR 2012a)
- [Yellowstone Lake & Blackhawk Lake Managed Lands](#) (WDNR 2012b)



SWSEL01. SUGAR RIVER WETLANDS SNA

Location

Property:	Sugar River Wetlands SNA
Landtype Association:	Sugar River Valley (222Kh02) and Hills and Valleys – Wisconsin River Drainage (222Lc18)
Approximate Size:	445 acres

Description of Site

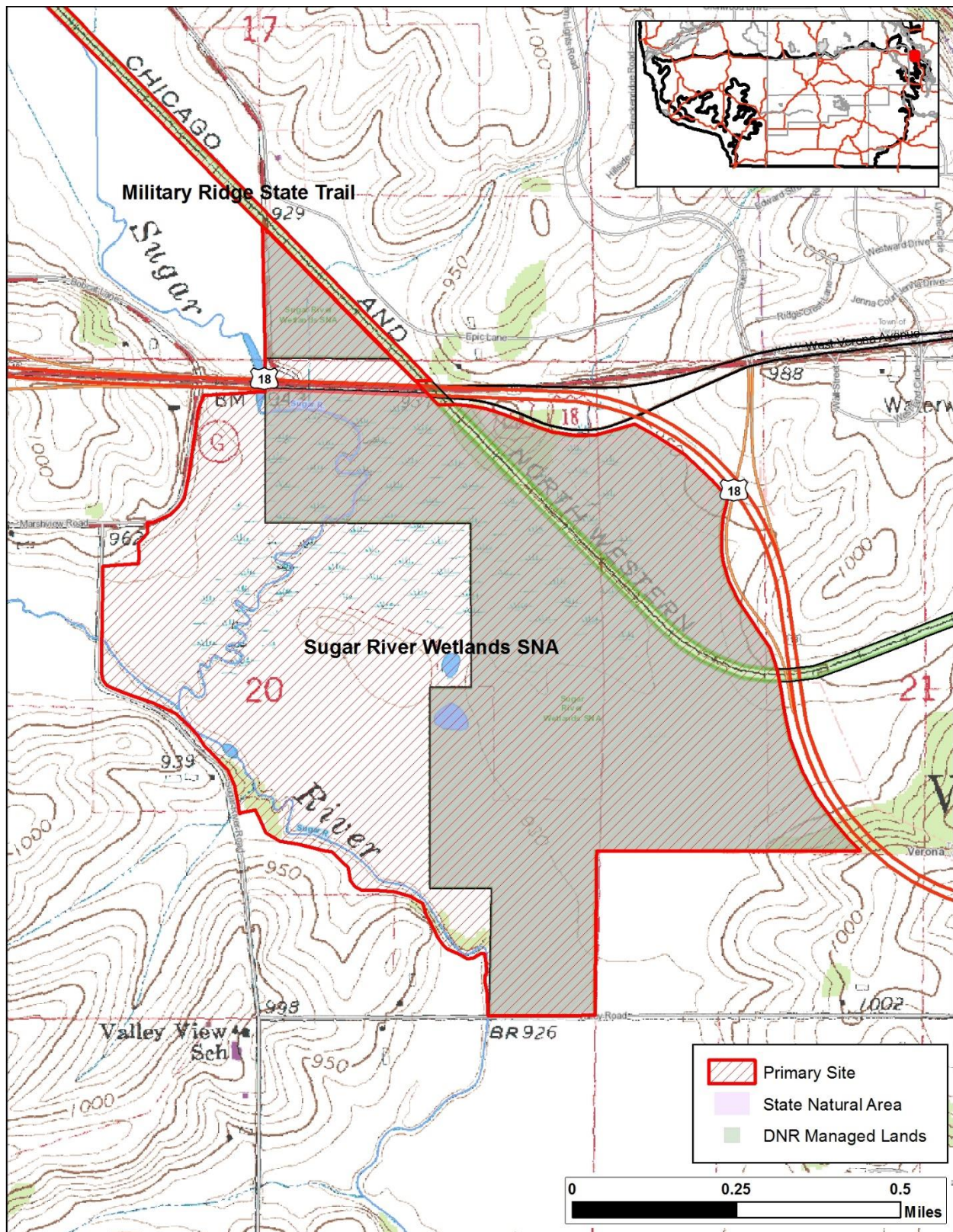
[Sugar River Wetlands SNA](#) features a diverse wetland complex located within the Upper Sugar River watershed and includes a large emergent marsh which is bordered by sedge meadow and small pockets of shrub-carr. The site is bisected by the Military Ridge State Trail and lies just southwest of Verona. The emergent marsh is dominated by cat-tail (*Typha* spp.) with patches of diverse forbs. The sedge meadow is dominated by tussock sedge (*Carex stricta*) with pockets of fountain sedge (*C. trichocarpa*) and wiregrass sedge (*C. lasiocarpa*) in areas with calcareous groundwater upwelling. Several calcareous indicator forbs are present but uncommon. Small patches of prairie cordgrass (*Spartina pectinata*) are also present and border the sedge meadow and adjacent emergent marsh around the perimeter of site, a remnant of wet-mesic prairie that likely occurred on the site prior to adjacent land use conversion and fire suppression. Areas directly adjacent to the Sugar River are dominated by reed canary grass (*Phalaris arundinacea*). Planted prairie and a wetland restoration occur on the southern portion of the site on former agricultural land.

Significance of Site

This extensive wetland harbors good-quality calcareous sedge meadow and emergent marsh as well as numerous rare plant and animal species, including one rare herptile and three rare wetland plants. Two additional rare plants were also reported from the site in the past. The upper Sugar River also contains one of the most diverse fisheries in southern Wisconsin, highlighting the importance of this site to buffer negative impacts from extensive development in the surrounding area. Sugar River Wetlands is owned by the DNR and was designated a State Natural Area in 1996.

Management Considerations

The area is part of a larger grassland habitat restoration complex along the Sugar River, which seeks to establish landscape management areas for the benefit of declining grassland birds and animals, vegetation communities, and invertebrates that depend upon native vegetation. Much of the emergent marsh is dominated by the invasive hybrid cat-tail (*Typha X glauca*). Although it does not appear to be excluding native graminoids and forbs, regular monitoring is recommended. The river corridor is dominated by reed canary grass and receives an estimated 20,000 pounds of phosphorus per year, mostly from upstream agricultural non-point sources (WDNR Pollutant Load Ratio Estimation Tool). This ongoing excess nutrient input plus regular reed canary grass seed dispersal from upstream sites limits the potential for stream corridor vegetation restoration. The degree to which excess nutrients are fueling cat-tail expansion is unknown, especially as groundwater also contributes to the water supply of the wetland interior. The proximity of the site to the city of Verona and U.S. Highway 18/151 also impacts the site, both in relation to stormwater runoff as well as smoke management during prescribed fire. Continued prescribed burning is recommended for maintaining the sedge meadow, prairie cord-grass pockets, emergent marsh, and planted prairie. To limit unintentional mortality of rare plants that grow along the Sugar River State Trail as it passes through this site, limit soil disturbance, conduct periodic brushing, and avoid overspray of herbicides; see more detailed recommendations under the Military Ridge State Trail primary site write-up.



SWSEL01. Sugar River Wetlands SNA Primary Site

SWSEL02. MILITARY RIDGE STATE TRAIL

Location

Property:	Military Ridge State Trail
Landtype Association:	Sugar River Valley (222Kh02) and Hills and Valleys – Wisconsin River Drainage (222Lc18) and Platteville Savannah (222Le02)
Approximate Size:	147 acres

Description of Site

The Military Ridge State Trail is primarily a walking and biking trail on a former railroad grade that spans 40 miles between Fitchburg and Dodgeville. Of this, a primary site is designated on a 9-mile stretch between Sugar River Wetlands SNA near Verona and the eastern edge of Mt. Horeb. For about half of this segment, the trail runs through the Upper Sugar River valley and passes through numerous wetlands. The trail right-of-way and occasional wider state ownership ranges from locally high-quality sedge meadow to weedy uplands dominated by boxelder (*Acer negundo*), non-native invasive shrubs and forbs such as Eurasian bush honeysuckles (*Lonicera* spp.), wild parsnip (*Pastinaca sativa*), and Japanese hedge-parsley (*Torilis japonica*).

Significance of Site

The site harbors a very large population (possibly the largest in the state) of a rare plant endemic to the Upper Midwest, known in Wisconsin almost exclusively from the edges of current and former railroad grades. It is thought that the plant was once more common in mesic to wet-mesic prairies and openings along streams and floodplains, but it is now largely restricted to rail and trail corridors due to habitat loss and fire suppression.

Management Considerations

The rare plant known from the trail requires open habitat. Periodic brushing (i.e., once every 3-5 years) of the right-of-way along this stretch of trail is recommended to maintain habitat for this Midwest endemic. Brushing should be timed for maximum impact on woody shrubs and small trees, such as late summer or early fall. This should minimize impact to the rare plant, which is a robust perennial that fruits between early August and late September; mowing may also serve to disperse seeds. It should be noted that mowing may also disperse seeds of non-native invasive species, and a more thorough survey of invasive species along the trail may be warranted in an effort to limit their spread. Due to the semi-continuous presence of the rare plant, broadcast spraying of broadleaf herbicides should be strictly avoided; targeted use of herbicides by knowledgeable professionals trained in rare plant identification is recommended. Soil disturbance and dumping of material from re-grading the trail or other maintenance should be avoided in areas where rare plants or high-quality natural communities are located.

SWSEL03. SUGAR RIVER STATE TRAIL

Location

Property: Sugar River State Trail
Landtype Association: Sugar River Valley (222Kh02)
Approximate Size: 119 acres

Description of Site

The Sugar River State Trail is primarily a walking and biking trail on a former railroad grade that spans 24 miles between New Glarus and Brodhead. Of this, a primary site is designated on two segments totaling approximately 10 miles between New Glarus and the Albany Wildlife Area; it includes parts of two units of the Albany Extensive Wildlife Habitat Area. The trail runs through the Little Sugar River valley and passes through numerous wetlands. The trail right-of-way ranges from locally high-quality sedge meadow to weedy shrub-carr and hardwood swamp dominated by boxelder and aspen (*Populus* spp.), as well as non-native invasive shrubs and forbs such as Eurasian bush honeysuckles, reed canary grass, and Japanese hedge-parsley. A small mesic prairie overgrown with shrubs is also present.

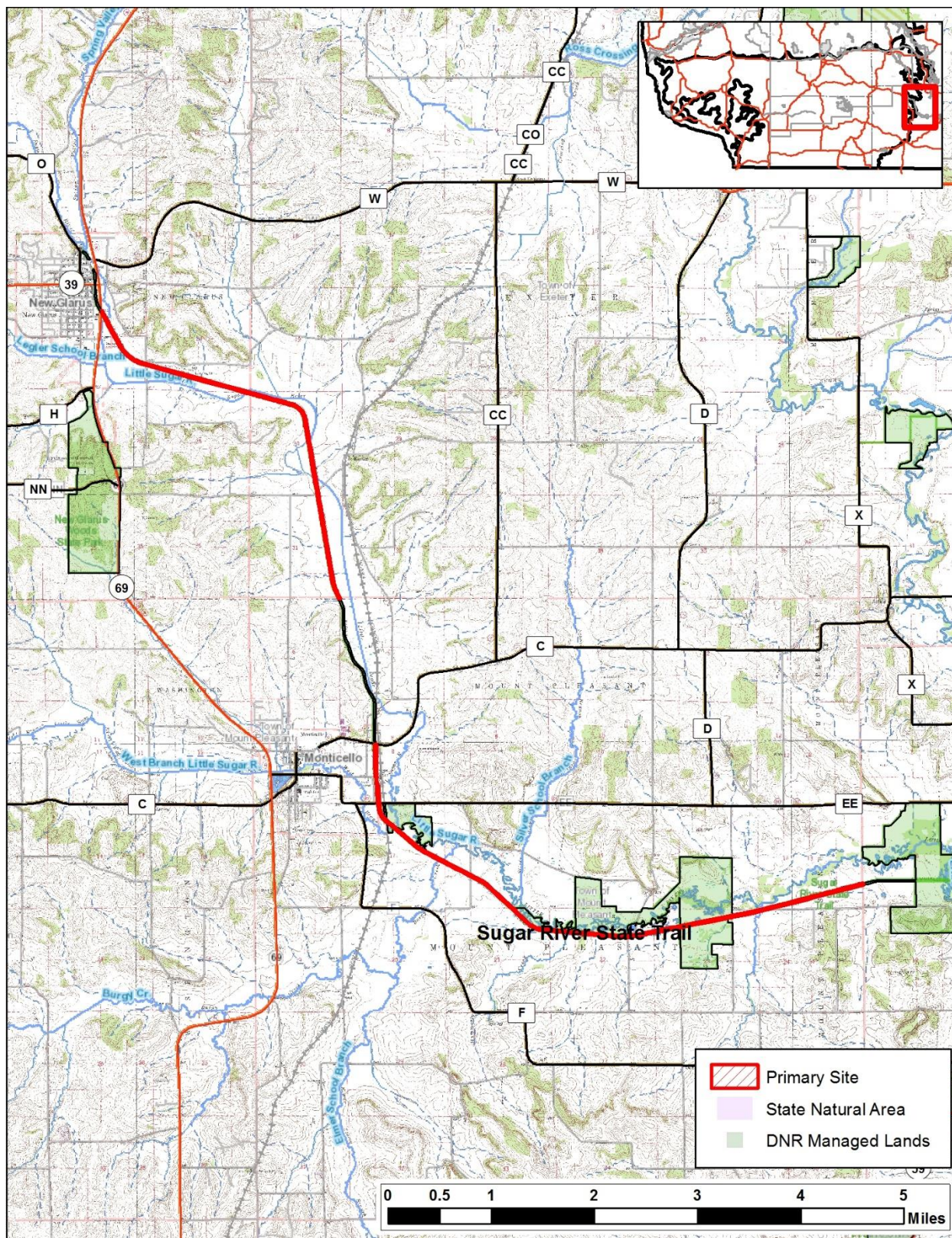
Significance of Site

The site harbors one of the largest populations in the state of a rare plant endemic to the Upper Midwest, known in Wisconsin almost exclusively from the edges of current and former railroad grades. It is thought that the plant was once more common in mesic to wet-mesic prairies and openings along streams and floodplains, but it is now largely restricted to rail and trail corridors due to habitat loss and fire suppression. Two additional rare plants and an animal associated with open wetlands as well as mesic prairie remnants are also known from the primary site. Several additional rare plants have also been reported from the trail corridor, although these populations have not been seen in over 30 years. The southeastern portion of the primary site lies within the Muralt Bluff COA, of statewide significance for its dry prairie, surrogate grasslands and oak opening restorations (WDNR 2008).

Management Considerations

The rare plant known from the trail requires open habitat. Periodic brushing (i.e., once every 3-5 years) of the right-of-way along this stretch of trail is recommended to maintain habitat for this Midwest endemic. Brushing should be timed for maximum impact on woody shrubs and small trees, such as late summer or early fall. This should minimize impact to the rare plant, which is a robust perennial that fruits between early August and late September; mowing may also serve to disperse seeds. It should be noted that mowing may also disperse seeds of non-native invasive species, and a more thorough survey of invasive species along the trail may be warranted in an effort to limit their spread. One invasive of concern is poison-hemlock (*Conium maculatum*), which is extremely poisonous and can be fatal if even a small amount is ingested. It was sparse along the trail about two miles southeast of New Glarus in 2018; while all plants that were found were removed, continued vigilance and follow-up treatment is recommended. Due to the semi-continuous presence of the rare plant, broadcast spraying of broadleaf herbicides should be strictly avoided; targeted use of herbicides by knowledgeable professionals trained in rare plant identification is recommended. Soil disturbance and dumping of material from re-grading the trail or other maintenance should be avoided in areas where rare plants or high-quality communities are located.

Management of the mesic prairie remnant that occurs along the trail is also strongly recommended. Mesic prairie is the most imperiled type of prairie in the state, with only a handful of sites remaining. Though heavily brushed in, restoration via brushing and prescribed burning is warranted, along with working with adjacent private landowners.



SWSEL03. Sugar River State Trail Primary Site

SWSEL04. OLSON OAK WOODS SNA

Location

Property: Olson Oak Woods SNA
Landtype Association: Platteville Savannah (222Le02)
Approximate Size: 192 acres

Description of Site

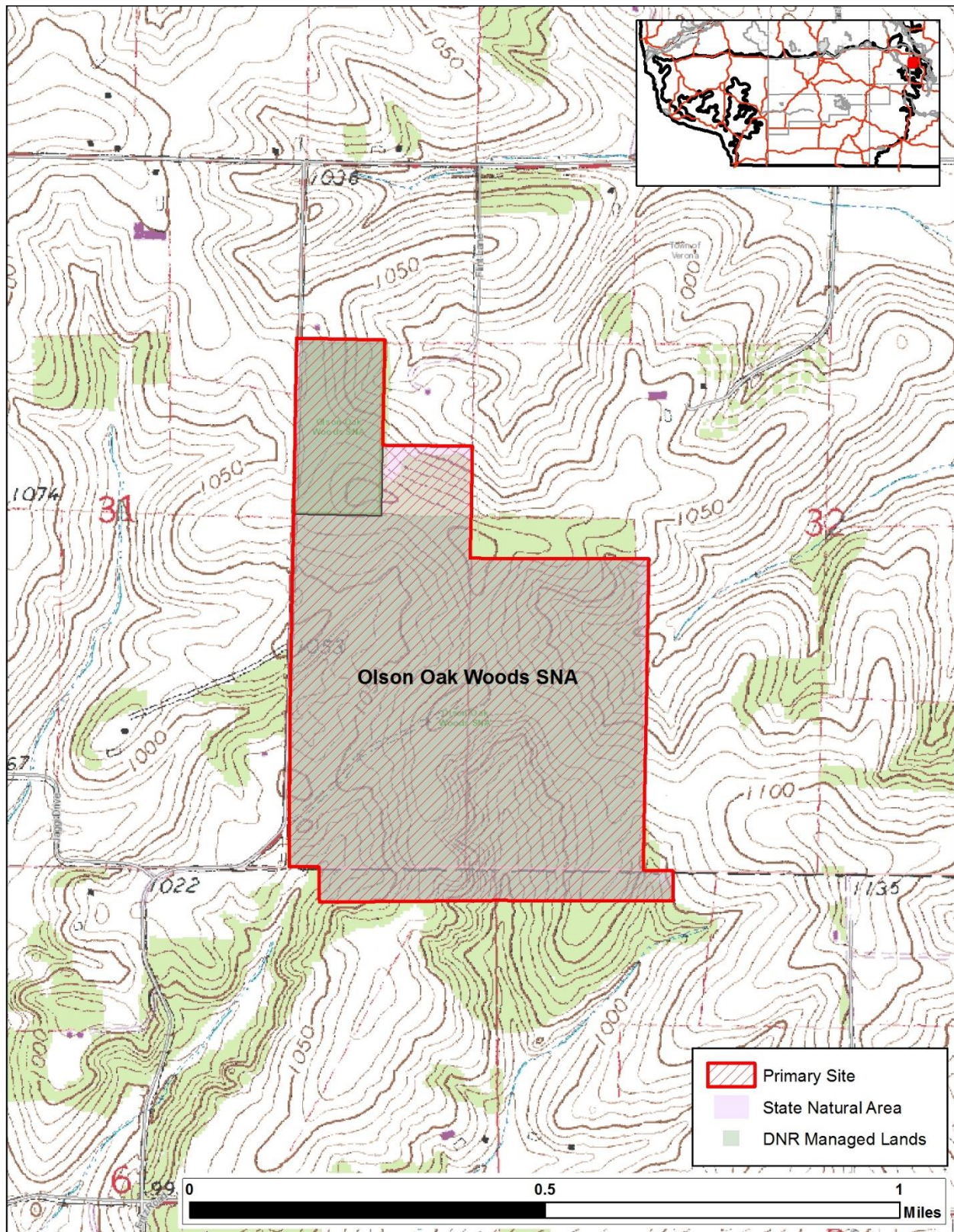
[Olson Oak Woods SNA](#) lies about three miles west of the Johnstown terminal moraine on a divide between branches of the upper Sugar River. Over the past decade or so, the site has been divided into different management units with different prescribed fire intervals including a control, with frequently burned areas restored to good-quality oak woodland and less frequently burned (or unburned) areas a southern dry forest. Dominant trees include white and black oaks with black cherry, bur oak, red oak, hickory, elm, and basswood. Scattered open-grown oaks dating to the 1750's and frequent multiple-stemmed trees from the 1840's are evidence of the former savanna conditions and occurrence of fire. Occasional ironwood, elm, sugar maple, and basswood occur in ravines. The richer valleys and ridges of loess and shale have better soil and support red oaks. On ridges with thin, dry soils over St. Peter sandstone abundant reproduction of white, red, and black oaks occurs. Bedrock ridges and sinkholes follow the ravine bottom and are scattered throughout.

Significance of Site

High-quality examples of oak woodland are extremely rare in Wisconsin, being limited to areas managed with frequent fire. The site is also significant for long-term ecological research plots established in 1946 by Grant Cottam (UW-Madison); plots were resampled in 1996 by Rich Henderson (Wisconsin DNR, retired). The site is home to over 40 species of breeding birds including two rare species. Of the 192-acre site, 20 acres are owned by the WDNR with the rest owned by the Madison Metropolitan School District, which utilizes the site for outdoor education and allows the DNR to conduct management site-wide. Olson Oak Woods SNA was designated a State Natural Area in 1980.

Management Considerations

Areas that have been frequently burned contain high-quality oak woodland. Targeted girdling of large mesophytic trees such as red maple has also been used to restore portions of the site. Given the rarity of oak woodland on the landscape, the site provides a unique opportunity to restore a larger block of this globally rare community. Although originally divided into separate management units for teaching and research purposes, expanding the use of frequent fire and girdling into previously designated "control" areas would be ecologically beneficial. Resampling of the research plots may also be desirable. Garlic mustard (*Alliaria petiolata*), Japanese hedge-parsley, and greater celandine (*Chelidonium majus*) are locally scattered throughout the site and continued control is recommended. Common buckthorn (*Rhamnus cathartica*) and Eurasian bush honeysuckle are common in the unburned control unit. Focus on slowing spread of invasives along trails by limiting seed reproduction along trails, installing boot brushes at all trail heads, and decommissioning unnecessary trails. An opportunity also exists to reintroduce missing ground layer species using Grant Cottam's historical plant surveys as a reference (Cottam 1948, 1949).



SWSEL04. Olson Oak Woods SNA Primary Site

SWSEL05. YORK PRAIRIE SNA

Location

Property: York Prairie SNA
Landtype Association: Military Ridge Prairie (222Le01)
Approximate Size: 504 acres

Description of Site

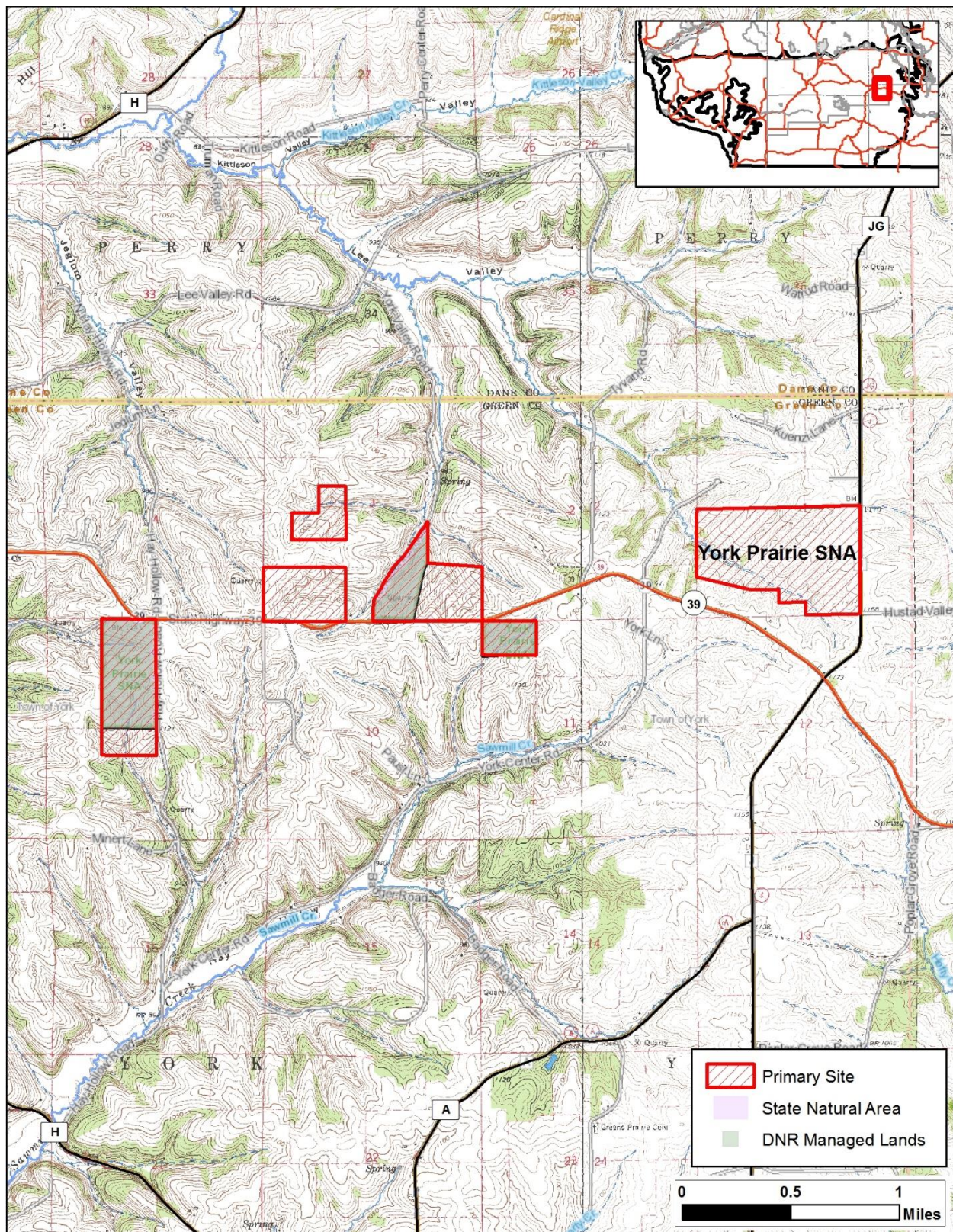
[York Prairie SNA](#) features remnants of tallgrass prairie within an agricultural landscape and includes high-quality patches of dry-mesic prairie with over 100 species of native prairie plants including conservative species such as cream gentian (*Gentiana alba*), wild quinine (*Parthenium integrifolium*), and marble-seed (*Onosmodium molle*). This 504-acre primary site follows the current SNA project boundary, which is comprised of six discrete units. Three of these units are currently privately owned, and two additional units are partially privately owned. Current state ownership totals 145 acres.

Significance of Site

Seven rare plants are found here including one that is federally threatened. With restoration, York Prairie has the potential to provide one of the largest acreages of prairie to help maintain this federally threatened prairie plant. Ten prairie-restricted insects have been found here, including a butterfly that is state endangered and a federal Species of Concern. Additionally, York Prairie provides critical habitat for numerous declining grassland birds including three state-threatened species. The site is located within the Southwest Grasslands and Streams COA, of Upper Midwest significance for its extensive surrogate grassland with large embedded patches of dry and dry-mesic prairie, southern sedge meadow, oak opening, and oak woodland. Four of John Curtis' Vegetation of Wisconsin (1959) study sites were located within this area. York Prairie was designated a State Natural Area in 2002.

Management Considerations

Management to maintain and expand prairie and surrogate grasslands through prescribed burning, brushing, and targeted use of herbicide is the priority for this site. Minimizing high-contrast forest edge within or adjacent to the site and maintaining grass cover within the larger landscape in a continuum of successional stages will maximize habitat for the numerous area sensitive rare species found here. Rotating management spatially and temporally using a variety of management techniques and timing (e.g., spring, summer, fall, dormant season) will benefit the greatest number of species and taxa groups by creating a variety of habitat structures. Due to the large number of rare species found at the site, all management should adhere to the Broad Incidental Take Permit/Authorization for grassland and savanna management to minimize the risk of take of listed species.



SWSEL05. York Prairie SNA Primary Site

SWSEL06. BROWNTOWN OAK FOREST SNA

Location

Property: Browntown-Cadiz Springs Recreation Area
Landtype Association: Pecatonica Valley (222Le03)
Approximate Size: 54 acres

Description of Site

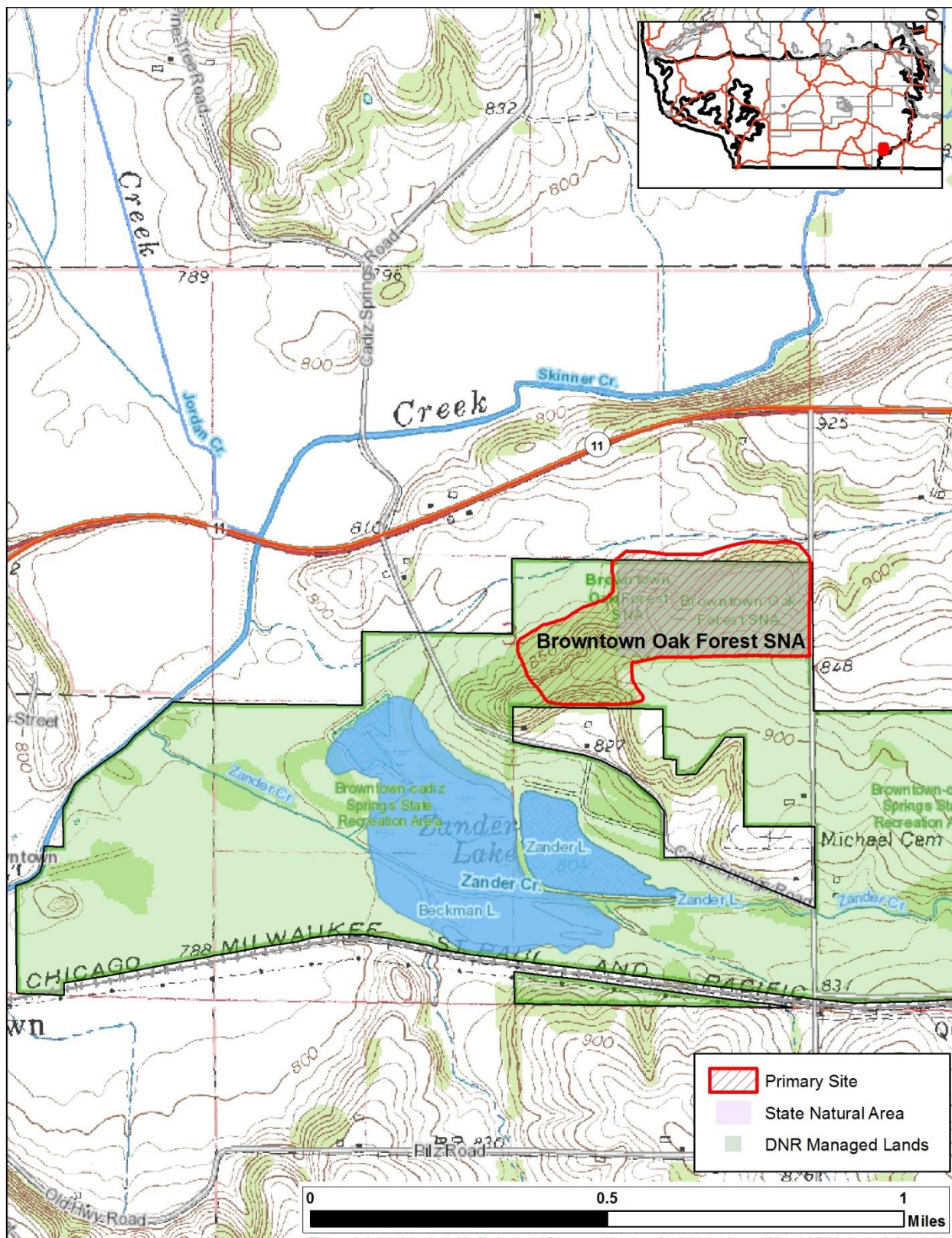
[Browntown Oak Forest SNA](#) occupies the north-facing slope of a St. Peter sandstone ridge in Wisconsin's Driftless Area and contains an excellent example of southern dry-mesic forest. On the ridge top and slopes the soil type is shallow Dodgeville silt loam. The lower edge has sandstone outcrops and falls steeply 50 feet to a low plain of Northfield sandy loam. This variation in soil type and topography fosters a range in plant communities from a dry-mesic forest dominated by red oak up to 40 inches in diameter on the upper slope to dry forest dominated by white and black oaks on the sandstone outcrops and lower plain. Smaller amounts of bitternut hickory, basswood, black cherry, and walnut are present. The numerous sugar maple saplings and abundance of spring ephemerals indicate a gradual shift to a more mesic nature.

Significance of Site

This is one of the best examples of southern dry-mesic forest in the SWS EL. Although small in size, it harbors two rare plants along with a variety of breeding bird such as tufted titmouse, blue-gray gnatcatcher, yellow-throated vireo, and orchard oriole. The forest is also heavily used as stopover habitat for migrating songbirds. Browntown Oak Forest was designated a State Natural Area in 1953. The current SNA boundary is a blocky shape and could be adjusted to follow ecological boundaries and encompass more of the high-quality forest.

Management Considerations

The increase of mesophytic species such as sugar maple, bitternut hickory, and hackberry has been documented for decades and poses a long-term challenge to management. Oak regeneration is sparse, and many oaks are 150 years old or more and are beginning to succumb to wind throw. Given the age of existing trees and predominantly mesic subcanopy, it is a near certainty the oak will gradually diminish. If expansion of oak into new areas is desired, an adjacent pine plantation northwest of the SNA could be removed and replanted to oak. Similarly, a 14-acre field immediately south of the forest could be planted to oaks to increase the size of the forest and maintain an oak resource at the site. Any oak restoration efforts would need to take deer browsing into account. Within the forest, prescribed burning has been used with success to promote dry-mesic species such as hickory and inhibit seedlings and saplings of fire-intolerant species, including scattered non-native invasive shrubs such as Bell's honeysuckle (*Lonicera X bella*). Continued use of fire would be beneficial both for the forest and one of the rare plant species. Garlic mustard (*Alliaria petiolata*) is also scattered throughout the woods and is controlled through manual control and spot-treatment with herbicide.



SWSEL06. Browntown Oak Forest SNA Primary Site

SWSEL07. PECATONICA RIVER WOODS AND MEADOWS

Location

Property: Pecatonica River Woods SNA
Landtype Association: Platteville Savannah (222Le02)
Approximate Size: 274 acres

Description of Site

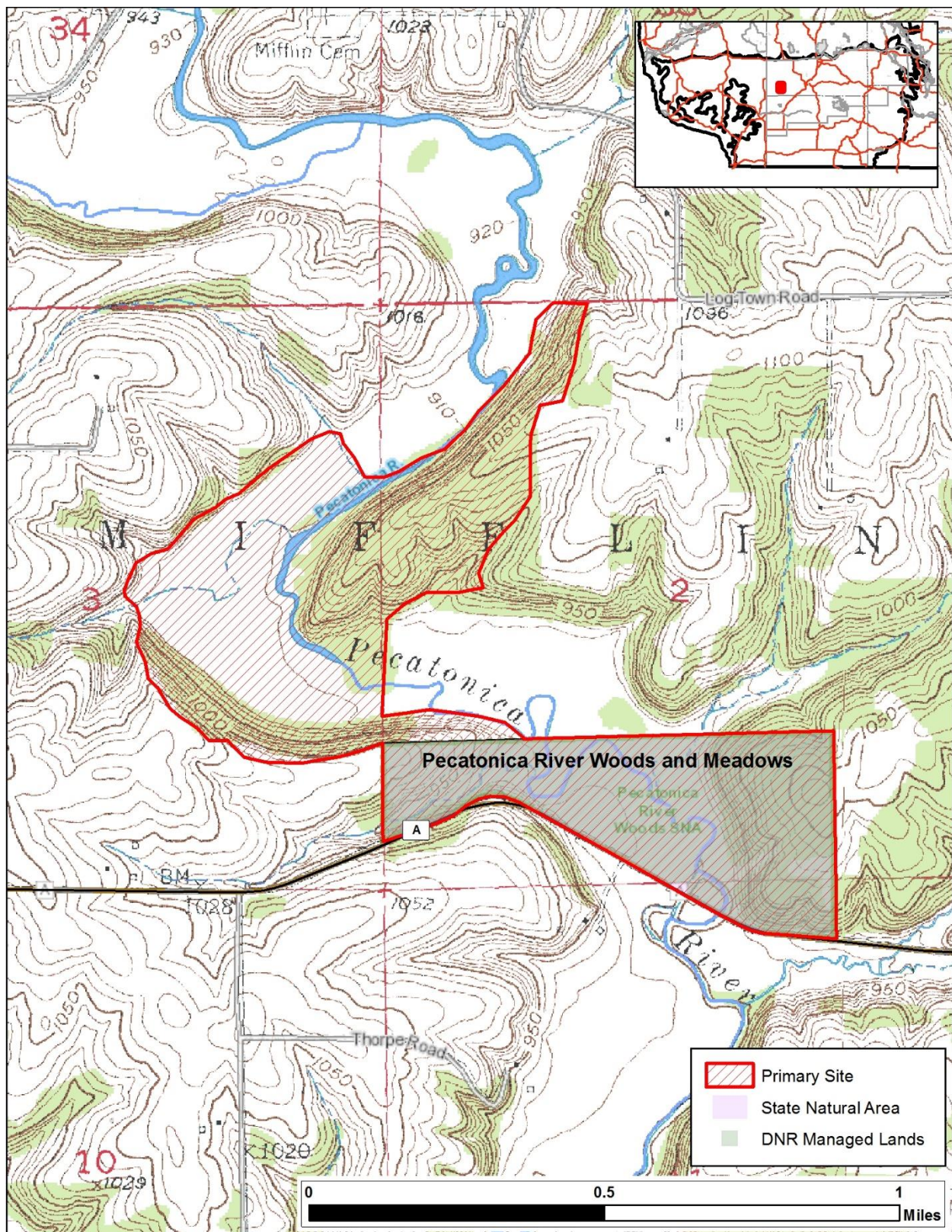
[Pecatonica River Woods SNA](#) features a mosaic of natural community types including southern dry, dry-mesic, and mesic forest and floodplain forest. A three-quarter mile reach of the Pecatonica River flows through the site flanked by silver maple and ash. To the east is a hillside with dry to mesic forest with white oak near the ridgetop and red oak, black cherry, black walnut, and sugar maple sloping down to the river. The primary site extends north and west beyond the current SNA boundaries encompassing an exceptional sedge meadow and a high-quality southern mesic forest.

Significance of Site

The site is remarkable for supporting ten rare species, including four state-endangered plants and a state-threatened snail. For two of the endangered plants, this site supports their largest population anywhere in the state. An additional rare plant is known from only three other locations in the state. The woods are high-quality and support numerous additional conservative species. The mesic forest north and east of the river is particularly unique and high-quality for the Southwest Savanna EL, likely due to a combination of being fire-protected by the river and minimally grazed, if ever. Pecatonica River Woods was designated a State Natural Area in 1992. Outside the current SNA boundary, the southern sedge meadow west of the river and mesic forest north and east of the river are of reference area quality and could be considered for incorporation into the SNA project boundary.

Management Considerations

The upland forest is managed with periodic prescribed burning and invasive species control. Non-native invasives include occasional garlic mustard, Bell's honeysuckle, and uncommon multiflora rose (*Rosa multiflora*). The southern sedge meadow has been managed with fire in the past.



SWSEL07. Pecatonica River Woods and Meadows Primary Site

SWSEL08. BELMONT MOUND WOODS SNA

Location

Property: Belmont Mound State Park
Landtype Association: Platteville Savannah (222Le02)
Approximate Size: 87 acres

Description of Site

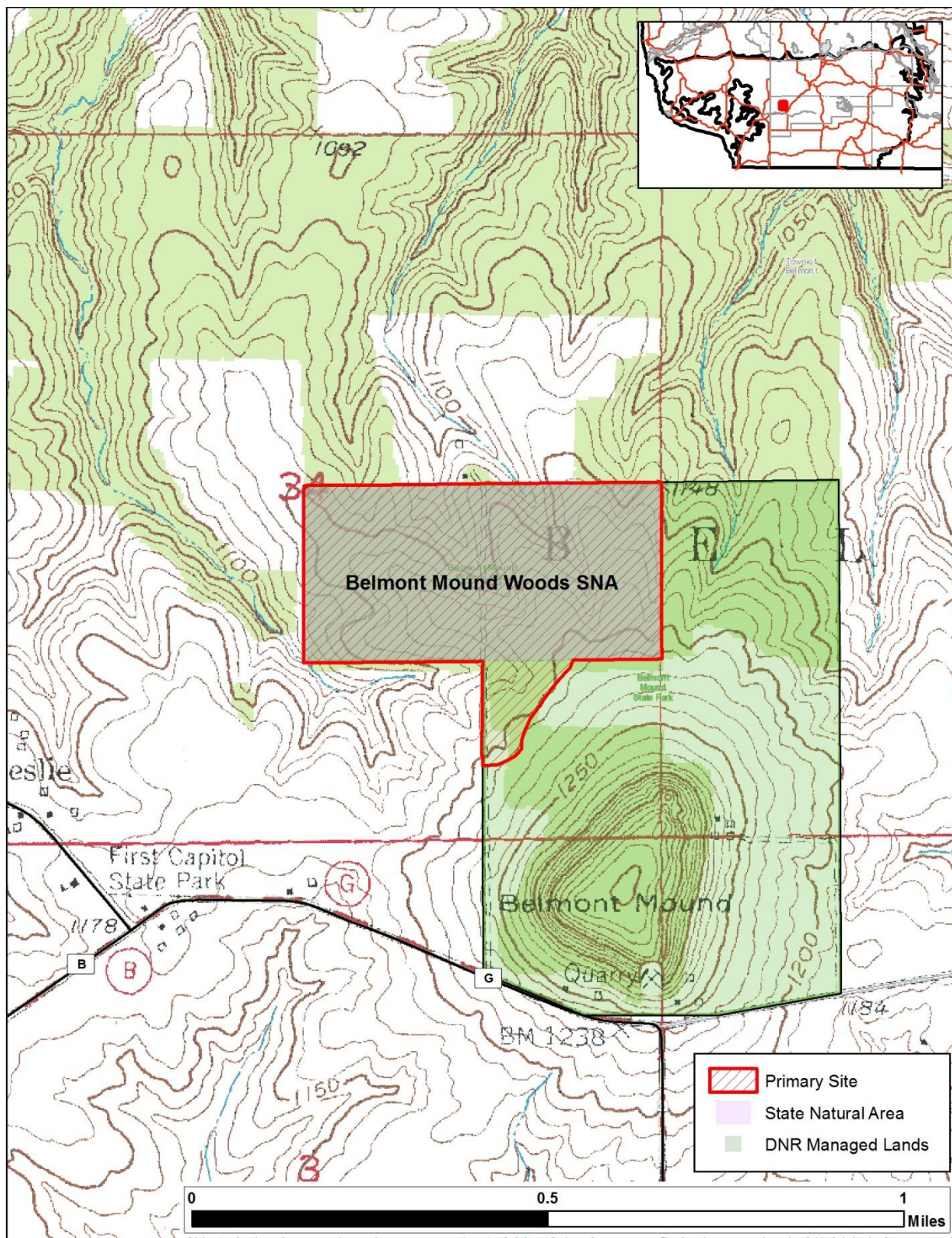
[Belmont Mound Woods SNA](#) features very good examples of southern mesic and dry-mesic forests located on the northern flank of an outlying exposure of Niagara dolomite, one of several such mounds in the Driftless Area. The east central part of the woods is more mesic with sugar maple dominating while larger red oak, basswood, and white ash dominate the remainder of the forest, with some black walnut and ironwood. The forest understory is particularly rich and includes wild leek (*Allium burdickii*), blue cohosh (*Caulophyllum thalictroides*), spring-beauty (*Claytonia virginiana*), hepatica (*Anemone americana*) and bloodroot (*Sanguinaria canadensis*). An intermittent stream flows northwest through the area adding local habitat variation.

Significance of Site

This site is unique among forested tracts in the region, as it retains much of its natural character and a diversity of species because it was never (or minimally) grazed or logged. In addition to the high-quality mesic woods, it supports two rare plants, a rare bird and provides breeding habitat for conservative forest birds such as wood thrush. Belmont Mound Woods was designated a State Natural Area in 1981.

Management Considerations

Invasive species are the primary management concern, with abundant garlic mustard, especially along roads and trails, occasional Bell's honeysuckle, and sparse Japanese barberry (*Berberis thunbergii*) documented in 2018. A two-track bisects the forest, running north-south, and should be monitored for the spread of known and new invasive species. Forested areas in the state park adjacent to the SNA are lower in quality due to previous logging and grazing.



SWSEL08. Belmont Mounds Woods SNA Primary Site

SWSEL09. BELMONT PRAIRIE SNA

Location

Property: Belmont Prairie SNA
Landtype Association: Military Ridge Prairie (222Le01)
Approximate Size: 36 acres

Description of Site

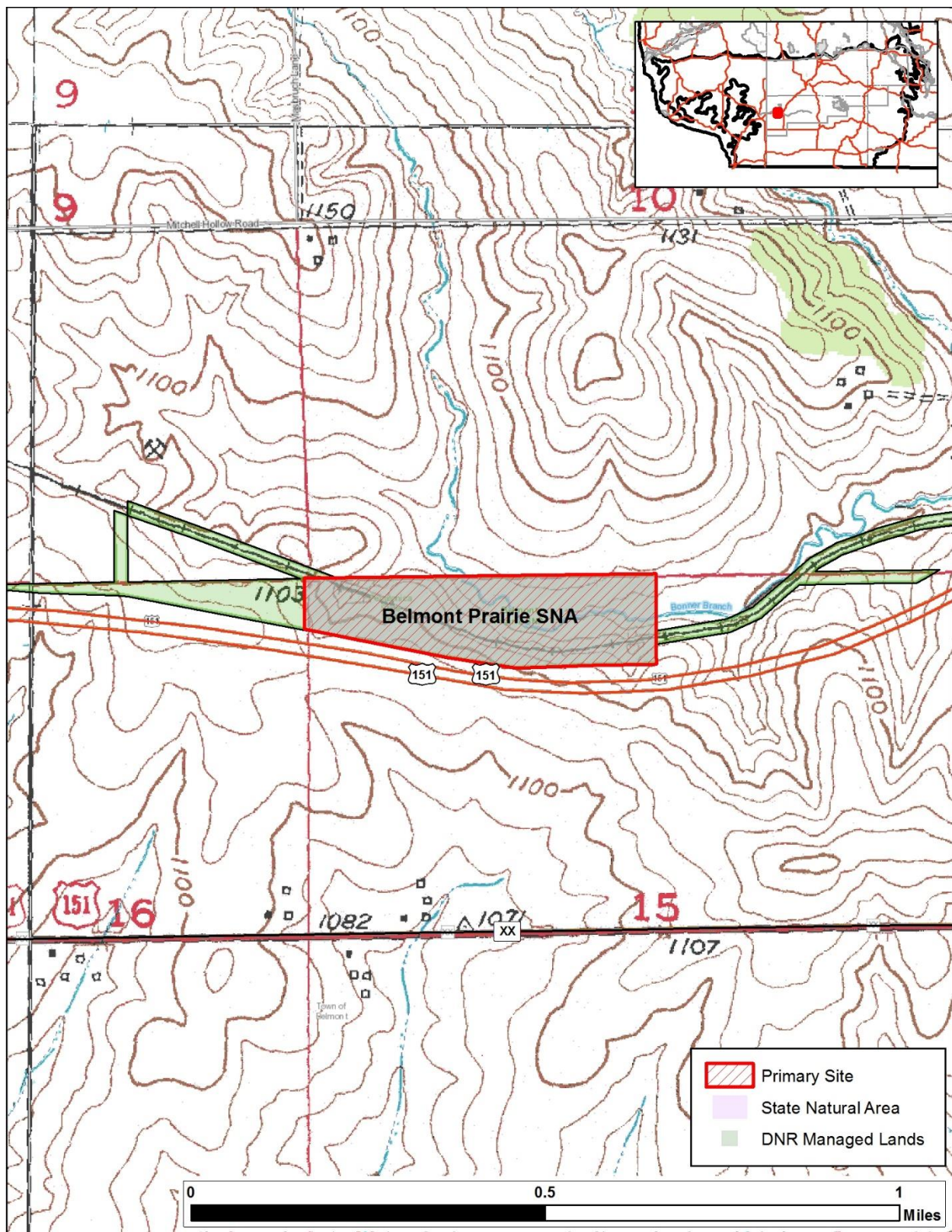
[Belmont Prairie SNA](#) is located along the Pecatonica State Trail, a former railroad right-of-way. It features a small mesic prairie remnant with over 80 species of native plants. Common grasses include big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*) and Indian grass (*Sorghastrum nutans*). Numerous conservative species are present such as rattlesnake master (*Eryngium yuccifolium*), wild quinine and purple prairie clover (*Dalea purpurea*).

Significance of Site

Mesic Prairie is one of the rarest native grassland communities in Wisconsin and across continental North America, having been nearly extirpated from the state due to Euro-American settlement and agriculture. Although small, surrounded by row crop agriculture and fragmented by a state trail, Belmont Prairie contains a good-quality example of this rare community. It also supports a rare plant. Belmont Prairie was designated a State Natural Area in 2002.

Management Considerations

To the extent possible, expand the natural buffer for this tiny and fragmented remnant by reducing peripheral shading from woody species and controlling non-native invasives in the immediate surroundings (e.g., within 30 feet of the remnant). Including this buffer within the prescribed burn unit will help keep it open. Given its small size, woody species and non-native invasives pose a disproportionately larger threat to this prairie than they might on larger sites. Prescribed fires can reduce woody species encroachment while encouraging growth of native prairie grasses and forbs. Mowing or brushing will also be an important tool for controlling woody invaders as well as certain non-native invasives such as sweet clover. Judicious usage of herbicide to avoid collateral damage of prairie plants is important, as is placement of brush piles outside of the remnant prairie. Abundant or common non-native invasives include Kentucky bluegrass (*Poa pratensis*), smooth brome (*Bromus inermis*), wild parsnip, and Bell's honeysuckle; others include multiflora rose, reed canary grass, white sweet clover (*Melilotus alba*), red clover (*Trifolium repens*), spotted knapweed (*Centaurea biebersteinii*), and bird's foot trefoil (*Linaria vulgaris*). ATVs and snowmobiles are permitted on the Pecatonica State Trail but prohibited elsewhere in the SNA. The trail right-of-way is co-managed by Lafayette County and WDNR.



SWSEL09. Belmont Prairie SNA Primary Site

SWSEL10. IPSWICH PRAIRIE SNA

Location

Property: Ipswich Prairie SNA
Landtype Association: Military Ridge Prairie (222Le01)
Approximate Size: 18 acres

Description of Site

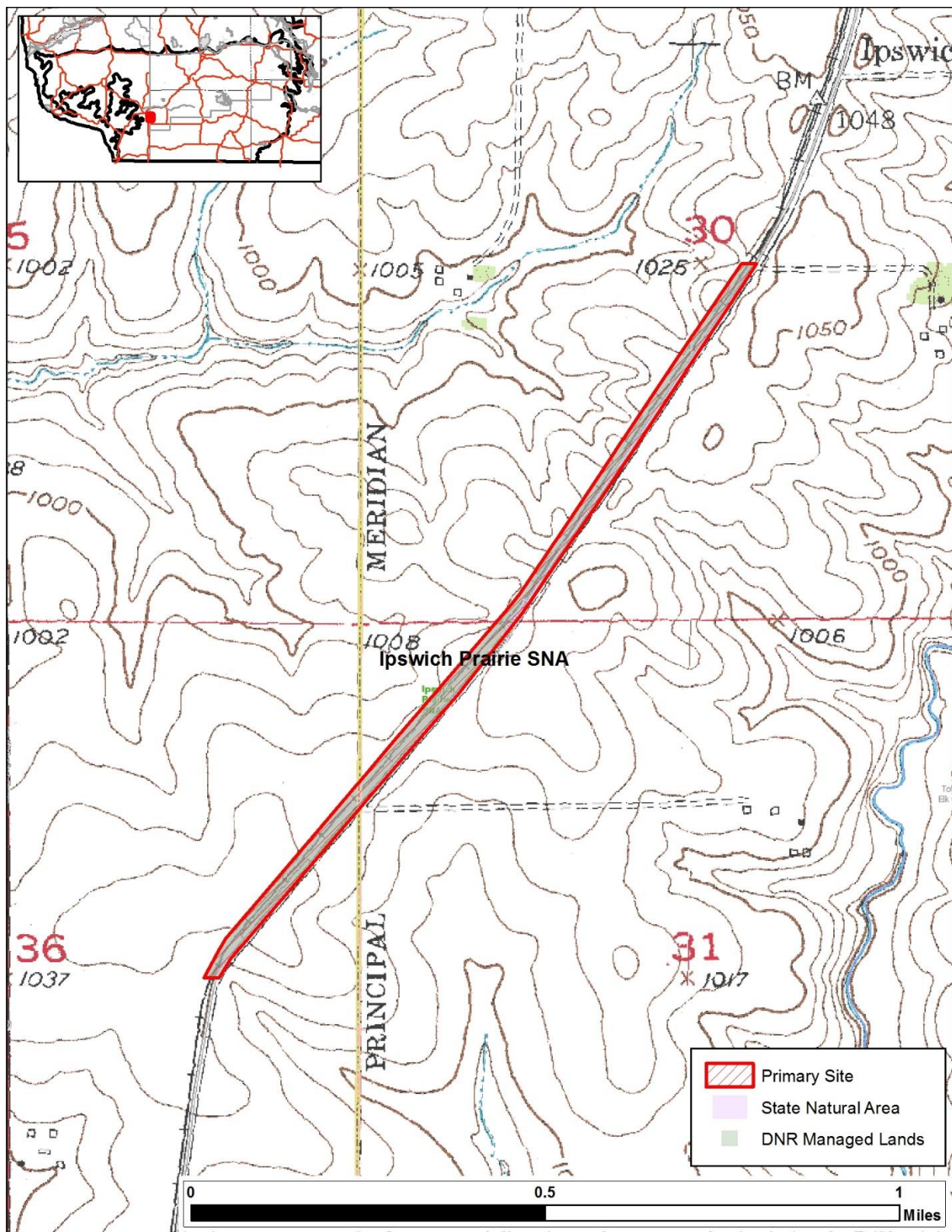
[Ipswich Prairie SNA](#) is the largest known remnant of deep-soil mesic prairie that once occurred in southwest Wisconsin. This long, narrow mesic to dry-mesic prairie stretches 1.2 miles along an old railroad right-of-way on the gently rolling topography of the Driftless Area. The prairie is maintained by regularly prescribed burning and brushing and the site contains a moderately rich prairie flora with over 125 species. The prairie supports numerous colonies of mound building ants.

Significance of Site

This site is considered one of the largest mesic prairie remnants in southwest Wisconsin. Mesic Prairie is one of the rarest native grassland communities in Wisconsin and continental North America. Several rare species have been documented on the site, including an endangered frog, a rare lepidopteran, and a rare small mammal; however, none have been observed in the past 25 years. Ipswich Prairie was designated a State Natural Area in 1985.

Management Considerations

Historically, fires by Native Americans, natural wildfires and occasional post-settlement railroad fires caused by passing trains preserved the open character of this prairie. Today, the prairie is maintained through prescribed burning and brushing. However, Ipswich Prairie has suffered a long, slow decline since first being identified in the 1950s as a significant site. These include a host of factors ranging from invasive species, lack of prescribed fires of sufficient frequency and intensity, mesic loess soils that are easily colonized by woody species, difficulty controlling brush with mechanized equipment due to steep railroad berms, atmospheric nitrogen deposition further fueling woody and invasive species, and fragmentation and poor landscape context, being a linear strip 15-30 yards wide and bordered on one side by a town road and intensive agriculture on the other. Today, approximately two-thirds of the site is poor in quality due to dense woody brush or aggressive forbs like giant ragweed (*Ambrosia trifida*) and sunflowers (*Helianthus* spp.).



SWSEL10. Ipswich Prairie SNA Primary Site

Future Needs

This project was designed to provide a biotic inventory of the biodiversity values for the Southwest Savanna Ecological Landscape. Although the report should be considered adequate for master planning purposes, additional efforts could help to inform future adaptive management efforts, along with providing useful information regarding the natural communities and rare species of the SWS EL.

Invasive Species

- Comprehensive invasive species inventory and management plans are needed for each property. This plan should include a monitoring strategy for detecting and rapidly responding to new invasive threats. Early detection and rapid response is much more cost-effective compared to waiting until invasives are well-established on the landscape. Examples of species that were detected on properties but that do not appear to be widespread in the SWS EL include oriental bittersweet, Japanese barberry, and Amur honeysuckle (*Lonicera maackii*). Another rapidly spreading species that is of public health concern is poison hemlock, which can be fatal if ingested. This list is not intended to be a comprehensive and species noted above are included only as examples. Please consult the DNR invasive species program for the most up to date list of known species distributions and strategic priorities.
- A management plan is needed for the Military Ridge and Sugar River State Trails that appraises trail managers of rare plant locations and identifies ways to maintain habitat for rare species and meet their maintenance needs for the recreational corridor while minimizing collateral damage to the rare plants.

Natural Communities

- Conduct continued management and monitoring of oak woodlands and southern dry-mesic forests to restore structure and groundlayer, and control invasive species.
- Conduct continued management and monitoring of dry and dry-mesic prairies.
- Conduct surveys of partner lands for high-quality examples of natural communities (e.g., land conservancy holdings and easements, county land, etc.).
- Resurvey Cottam/Henderson vegetation plots at Olson Oak Woods SNA and find support for data analysis (e.g., graduate student project).

Rare Plants

- Continue to survey for rare plants not observed in the past 20 years.
- Monitor populations of rare Southwest Savanna EL specialists such as prairie bush-clover, glade mallow, prairie Indian-plantain, prairie turnip, pale purple coneflower, nodding pogonia, and fire-pink.
- Consider establishing new populations of federally threatened prairie bush clover in high quality, protected dry-mesic prairies with a commitment to long term management to reduce risk of statewide extirpation, as most extant populations in the state are limited to very small and vulnerable prairie remnants.

Birds

- Continue monitoring grassland bird species such as dickcissel, grasshopper sparrow, Henslow's sparrow, bobolink, eastern and western meadowlark, upland sandpiper, and loggerhead shrike.
- Continue monitoring oak savanna specialists, such as red-headed woodpecker, and shrub-loving species like Bell's vireo, yellow-breasted chat, and northern bobwhite that are strongly associated with the SWS EL.

Small Mammals

- Conduct small mammal surveys throughout the SWS EL to inventory for common and rare prairie and grassland species (e.g., prairie vole, prairie deer mouse, Franklin's ground-squirrel), and oak savanna/woodland species (woodland vole).

Herptiles

- Conduct inventory of North American racer, lined snake, Western wormsnake, prairie ring-necked snake, gray (black) ratsnake, plains gartersnake and six-lined racerunner in grassland habitats.
- Continue to conduct frog calling surveys and monitoring of Blanchard's cricket frog, and visual searches for pickerel frog and Blanding's turtle.

Invertebrates

- Conduct inventory for native bees, especially the rusty-patched bumblebee (*Bombus affinis*).
- Conduct inventory and monitoring of prairie-associated butterflies, moths, and other insects, especially very rare species such as regal fritillary, Ottoe skipper, and red-tailed prairie leafhopper.

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